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- Published:**
- *With international search report.*
  - *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

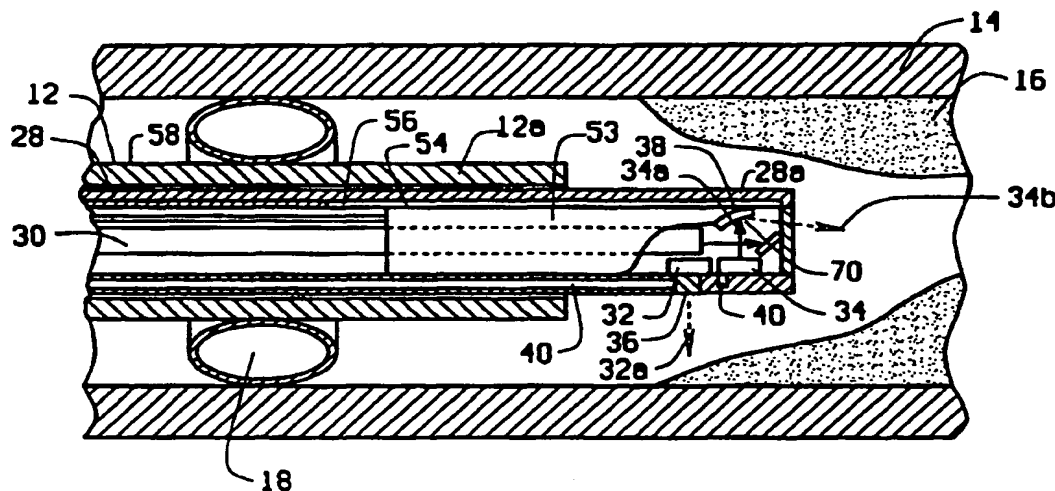
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[Continued on next page]

**(54) Title: CATHETER FOR LASER TREATMENT OF ATHEROSCLEROTIC PLAQUE AND OTHER TISSUE ABNORMALITIES**



**(57) Abstract:** A medical catheter (10) for treating atherosclerotic plaque and other abnormalities includes optical fibers (30) for applying laser energy (100) to the plaque and an ultrasonic transducer system (32, 34) for sensing the location and configuration of the plaque. The optical fibers (30) and electrical wiring for the transducers (32, 34) extend through a probe (28) which is rotatable inside of the catheter tube (12) to provide universal directional control of the fibers (30) and transducers (32, 34). A reflective system includes a curved reflector (38) in the probe (28) which can be axially adjusted to vary the direction of the ultrasonic signals. Alternative forms of the invention include different reflector schemes, an angled ultrasonic transducer (110) having a conical signal output that varies with frequency, and various different systems for rotating the transducers and fibers.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

 International application No.  
 PCT/US99/24099
**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : A61B 1/04

US CL : 606/3, 7, 10-18; 600/407, 437, 439

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 606/3, 7, 10-18; 600/407, 437, 439

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 93/14689 A (WINSTON et al.) 05 August 1993, entire document.	1, 22
Y		23

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*B* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

05 AUGUST 2000

Date of mailing of the international search report

28 SEP 2000

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/24099**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 2-21, 24-26  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
  
The claims depend from claims that do not exist in the file. Greatest pending claim number is 26, lowest claim number that dependent claims depend from is 70.
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.